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**Deutsche Thomson-Brandt GmbH Patent-
und Lizenzabteilung Göttinger Chaussee 76
W-3000 Hannover 91(DE)**(54) **Method and apparatus for controlling a recording device.**

(57) In order to record automatically a video program a VTR does need a timer and programming features. In case of scrambled TV programs a pay TV decoder has to be switched on when recording. New generation pay TV systems include the transmission of data identifying the kind of program. By providing an infra-red transmitting diode at the cabinet of the pay TV decoder this decoder can control the VTR via the infra-red link. The VTR does not need programming features and is switched on automatically at the event of a pre-selected program received by the pay TV decoder.

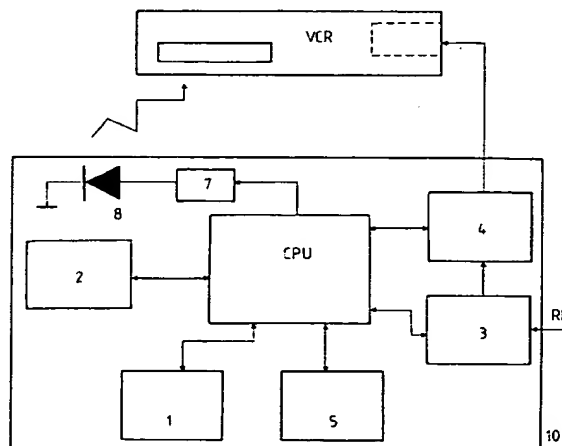


Fig.1

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The present invention relates to a method and to an apparatus for controlling a recording device.

Background

In order to record automatically a TV program, the use of timer and programming features of a VCR (video cassette recorder) are mandatory. In case of a pay TV program, both devices, VCR and decoder, have to be working at the same time. Furthermore the use of a timer presumes that the program will be broadcasted at the originally scheduled time.

Invention

It is one object of the invention to disclose a method of controlling a recording device without needing timer and programming features of the recording device.

This object is reached by the inventive method disclosed in claim 1.

The new generation of pay TV systems uses data transmission in order to transfer the information needed for descrambling and deciphering. Currently for the control access system the information describing the identity of the broadcasted program is transmitted among these data.

In a modified pay TV decoder an IR (infra-red) transmitter diode at an output of the pay TV decoder controls via an IR link any VCR equipped with an IR remote control. The pay TV decoder will emulate the IR hand set normally used for controlling the VCR.

Due to the specificity of the recorded programs some advantageous functions can be added. There is no interest to record a program the user is not entitled to view. For that purpose a smart card which is necessary to have access to the broadcasted TV program will be used to propose only the entitled programs to the customer selection. The following specific selection modes can be implemented:

Automatic mode:

If the smart card is not currently needed for a recording, it checks automatically every channel in order to find the first one broadcasting an entitled program and then switches the pay TV decoder or the VCR to that channel and requests recording.

List mode:

The smart card is used to propose (display) every entitled program to the user for selection.

Channel mode:

The smart card is used to propose (display) every entitled channel to the user for selection. The card will then be used to record only entitled programs broadcasted on the selected channel.

Theme mode:

The smart card is used to propose (display) every entitled themes to the user for selection. The card will then be used to record only entitled programs belonging to that theme and broadcasted on every channel.

Time optimizer mode:

This mode can be implemented only on pay TV services where there is a way to examine the foreseen schedule for each channel, for instance D2MAC. The user enters the total play time of a VCR tape and the smart card is used to choose a program selection (e.g. of equal theme) which will optimize the use of this tape over a specific period, e.g. a day. The total play time of the tape can also be entered automatically with different known methods.

In principle the inventive method consists in using program identification data of a pay TV system to command a recording device, whereby a pay TV decoder can evaluate the program identification data and the recording device can be commanded via an infra-red link between the pay TV decoder and the recording device.

Advantageous additional embodiments of the inventive method are resulting from subclaims 2 to 9.

It is a further object of the invention to disclose an apparatus which utilizes the inventive method. This object is reached by the inventive apparatus disclosed in claim 10.

In principle the inventive apparatus consists in a microcontroller which is connected to a tuner, to a de-scrambling stage, to an access control unit, to a user interface, to a memory and to a current source, whereby said tuner receives TV RF signals and said microcontroller controls the frequency of said tuner and whereby the scrambled and demodulated video and/or audio signals become descrambled in said de-scrambling stage and the descrambled video and audio signals can be fed to respective inputs of said recording device and whereby a user can select an authorized program through said user interface and whereby infra-red code sequences can be stored in and read out from said memory and whereby said access control unit extracts the program information from the data stream which is sent for descrambling and whereby said microcontroller CPU extracts said code sequences from said memory, translates them and sends the according waveform to said current source which drives one or more infra-red transmitter diodes.

Drawing

Preferred embodiments of the invention will now be described with reference to the accompanying drawing:

Fig. 1 shows a video tape recorder which is controlled by the inventive pay TV decoder.

Preferred embodiments

A RF signal received from antenna or cable is fed to a tuner 3 of a pay TV decoder 10. The scrambled and demodulated video and/or audio signals become de-scrambled in a de-scrambling stage 4. The de-scrambled video and audio signals are fed to the respective inputs of a video cassette recorder VCR. The output of de-scrambling stage 4 may be provided with a modulator which converts the received RF frequency to a fixed RF frequency. The tuner 3, the de-scrambling stage 4, an access control unit 5, an user interface 1, a memory 2 and a current source 7 are connected to a microcontroller CPU.

The user may be able to select for recording any authorized program or all of them on any scrambled channel. This is performed through the user interface 1 and memorized in the non volatile memory 2. This selection can be changed at any time. The microcontroller controls the frequency of tuner 3.

The access control unit 5 extracts the program information from the data stream which is sent for descrambling. This data stream is split from the video data in de-scrambling stage 4 and evaluated by microcontroller CPU. If the currently broadcasted program has been selected by the user for recording, the microcontroller will extract from memory 2 the relevant information necessary to play a sequence of keys of the VCR.

This information can be stored in memory 2 under several formats: Real bit description of the waveform (PCM) or compression format in order to reduce the amount of memory capacity necessary to play back the code. It is very important to use a sequence of keys in order to record. This sequence and the format and code used depend only from the type of VCR.

It is recommended to allocate a predefined fixed programme number in the VCR, tuned on the frequency of the modulator in de-scrambling stage 4.

The sequence of action for recording is typically:

- wake up the VCR (change from stand-by mode to normal operation mode);
- tuning to modulator frequency in de-scrambling stage 4;
- record.

In the same way the pay TV decoder 10 will stop the recording at the end of the program by playing an appropriate sequence of keys.

The microcontroller CPU extracts the IR code data from memory 2, translates them and sends

the right waveform to the current source 7 or to another output which may be connected via cable to the VCR. The current source 7 drives one or more IR transmitter diodes 8. The VCR may quit if it has received a valid code which can be verified by the microcontroller.

If several scrambled channels are broadcasted, different policies can be used. In the data stream of each channel is present a list of all broadcasted programs. The pay TV decoder 10 may then select the desired channel. Else it may switch from one channel to an other until it finds a service to be recorded.

The data used to send the IR codes can be loaded to the pay TV decoder by different ways, for instance:

- over the air addressing;
- down loading by an RS 232 link;
- down loading by a smart card, e.g. a special smart card which is used by an installer;
- down loading by an IR link in a predefined format.

This method obliges the program provider to have a data base which contains the sequence of codes for each type of VCR. He will also have to update this data base for all new IR codes of VCR's appearing on the market.

An other method is to provide a learning facility inside the pay TV decoder which would allow the user or an installer to store the code sequences by playing them to the pay TV decoder, advantageously by using the remote control of the VCR. The decoder will receive the codes, eventually analyze and compress them and store the respective IR code sequences inside memory 2.

Special programs, e.g. for lawyers, doctors or ethnic minorities, can be broadcasted during night time.

To diagnose possible failures during the broadcast period an event report can automatically be produced. This report summarizes the events that occurred during the night. The user has the possibility of consulting this report from an on-screen display menu:

EVENTS REPORT:

R666 F333

*902 *722

*903 F120

F001

F002

F099

PUSH ANY KEY

This example shows that services 666 and 099 were recorded, services 001, 002, 333 and 120 failed having been stopped by the user, services 902, 903 and 722 have not yet been recorded. If there had been a power shut-down during the period, this would also have been shown on the events report. In addition the program provider can block a particular service for a particular user by sending an over-the-air black list command, which would be shown by a 'B' against the service.

This event report can be stored on the smart card to record a trace of any faults, allowing for the possibility of the user or a service engineer to diagnose the fault. Storing the report on the smart card also allows the service center to diagnose the problem.

Claims

1. Method for controlling a recording device, **characterized in** that program identification data of a pay TV system are used to command said recording device (VCR). 20
2. Method according to claim 1, **characterized in** that a pay TV decoder (10) evaluates said program identification data and commands said recording device (VCR). 25
3. Method according to claim 1 or 2, **characterized in** that said recording device (VCR) is commanded by sequences of different codes. 30
4. Method according to any of claims 1 to 3, **characterized in** that said recording device (VCR) is commanded via an infra-red link. 35
5. Method according to any of claims 2 to 4, comprising one or more of the following steps in conjunction with said program identification data: 40
 - switching said pay TV decoder (10) from one channel to an other until a service to be recorded is found;
 - switching said recording device (VCR) from stand-by mode to normal operation mode; 45
 - tuning said recording device to a RF modulator frequency of said pay TV decoder;
 - switching said recording device to a record mode; 50
 - switching said recording device to a stop mode;
 - switching said recording device to a stand-by mode. 55
6. Method according to any of claims 3 to 5,

characterized in that said pay TV decoder (10) stores said code sequences in a memory, especially in a compressed format.

7. Method according to any of claims 4 to 6, **characterized in** that said pay TV decoder (10) emulates said infra-red link from a hand set which can be used to command said recording device (10). 10
8. Method according to any of claims 3 to 7, **characterized in** that said pay TV decoder (10) can work in a learning mode, whereby said code sequences are received either from data transmitted together with the TV signal received from said pay TV decoder or from data generated in a computer device transmitted via a RS232 link or from a smart card or from an infra-red link, especially by using said hand set which can be used to command said recording device. 15
9. Method according to any of claims 1 to 8, **characterized in** that said recording device (10) is a video cassette recorder.
10. Apparatus for a method according to any of claims 1 to 9, consisting of a microcontroller (CPU) which is connected to a tuner (3), to a de-scrambling stage (4), to an access control unit (5), to an user interface (1), to a memory (2) and to a current source (7), whereby said tuner receives TV RF signals and said microcontroller controls the frequency of said tuner (3) and whereby the scrambled and demodulated video and/or audio signals become de-scrambled in said de-scrambling stage (4) and the de-scrambled video and audio signals can be fed to respective inputs of said recording device (VCR) and whereby a user can select an authorized program through said user interface (1) and whereby code sequences can be stored in and read out from said memory (2) and whereby said access control unit (5) extracts the program information from the data stream which is send for de-scrambling and whereby said microcontroller (CPU) extracts said code sequences from said memory (2), translates them and sends the according waveform to said current source (7) which drives one or more infra-red transmitter diodes (8). 20

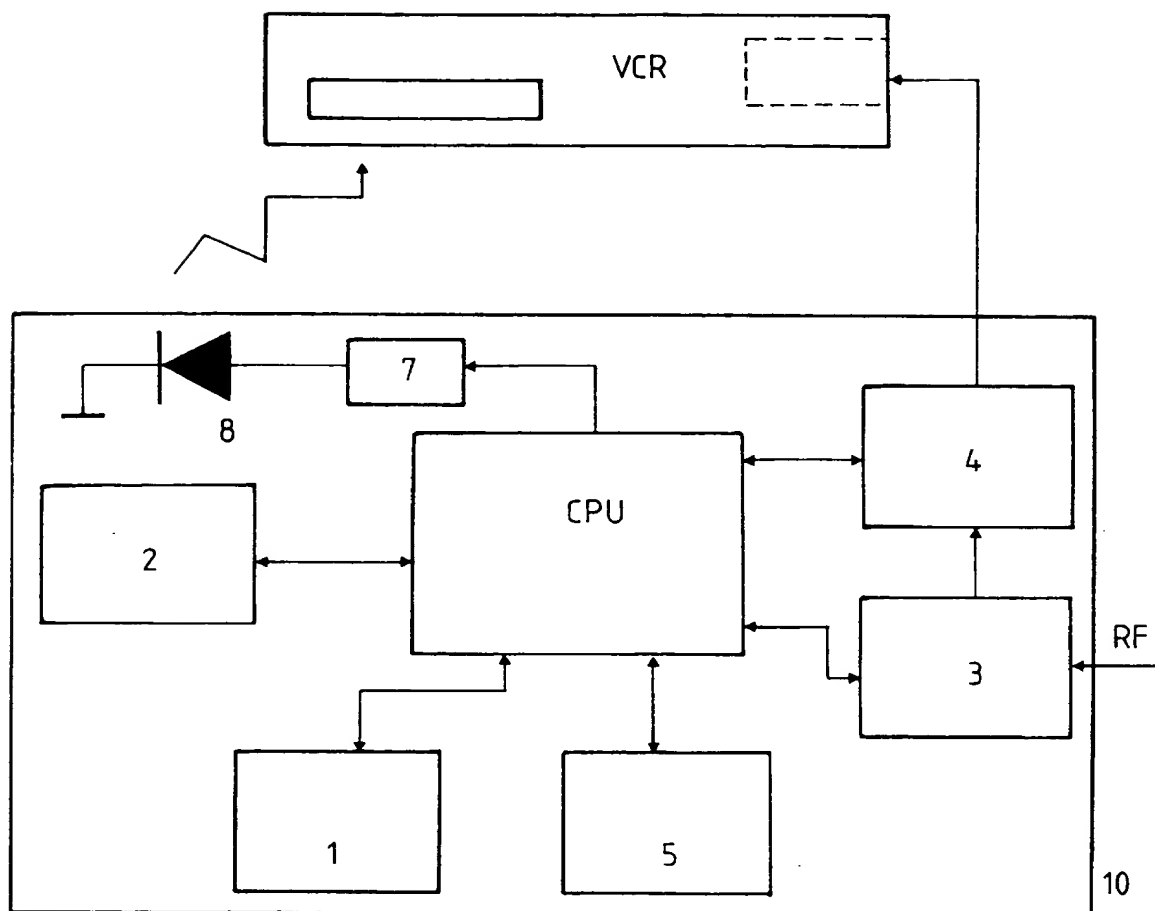


Fig.1

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AT BE CH DE DK ES FR GB IT LI NL PT SE(88) Date of deferred publication of the search report:
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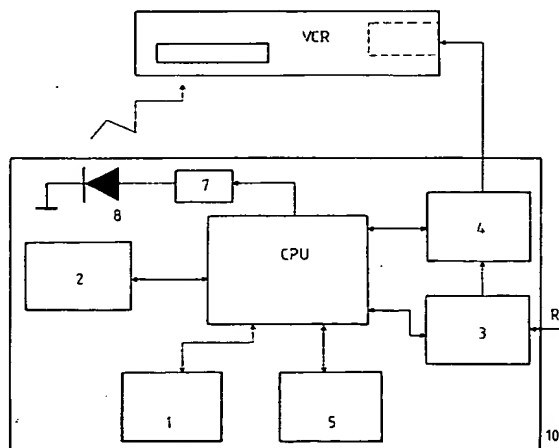


Fig.1

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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 6054

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-2 215 928 (RANK PRECISION INDUSTRIES LTD.) * page 4, line 1 - page 11, line 19 * * page 12, line 16 - line 21 * ---	1-10	H04N7/16
X Y A	WO-A-8 706 416 (BBC) * page 2, line 29 - page 4, line 34 * ---	1-7,9 8 10	
X A	GB-A-2 210 526 (GOLDSTAR) * abstract * * page 2, line 34 - page 6, line 30 * ---	1-2,5,9 10	
Y A	WO-A-9 001 847 (DEUTSCHE THOMSON BRANDT) * page 3, line 16 - page 4, line 10; claim 2; figures 1-2 * ---	8 1,4,7	
A	WO-A-8 303 329 (SCIENTIFIC-ATLANTA INC) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H04N
Place of search THE HAGUE		Date of completion of the search 04 NOVEMBER 1992	Examiner POIRIER, J.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons * : member of the same patent family, corresponding document			